3-27-2015

River Sieve Analysis of Soil Samples at Indiana-Purdue University Fort Wayne

Shelby Johnston
Indiana University - Purdue University Fort Wayne

River Sieve Analysis of Soil Samples at Indiana-Purdue University Fort Wayne

INDIANA UNIVERSITY
PURDUE UNIVERSITY
FORT WAYNE

Shelby JOHNSTON, Dr. Solomon ISIORHO

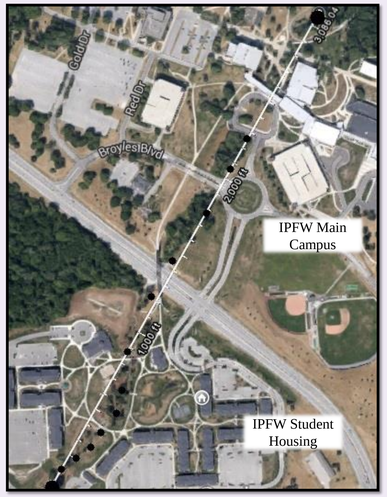
Department of Geology, Indiana-Purdue University Fort Wayne, Fort Wayne, IN 46805

Abstract

This study is to verify the grain size particle distribution becoming sorted and rounded as they move downstream along a creek at IPFW. Sieve analysis was performed on fourteen soil samples that were collected over the length of the creek. The data shows the water content and the grain sizes for each sample: average water content was 21.87% with minimal variation. Soils range from coarse-grain to very fine-grain sand, but were generally fine-grained sand. Knowing the cause(s) of the finding of sediments downstream in this river may help in managing this stream and probably others in NE Indiana.

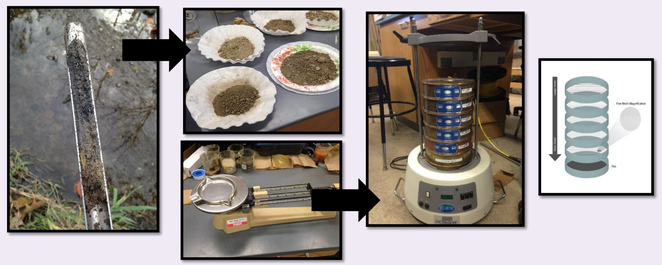
I. Introduction

- Sieve analysis is used in different industries:
  - Industrial and Chemical work
  - Pharmaceutical Companies
- Used here to classify soil around river based on grain size and relative proportions.
- Map of sampling area (samples marked) over parts of the IPFW campuses.



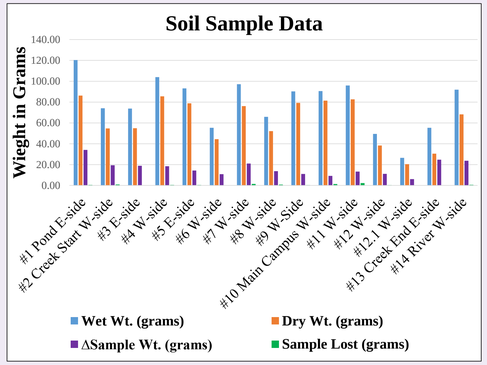
II. Methods

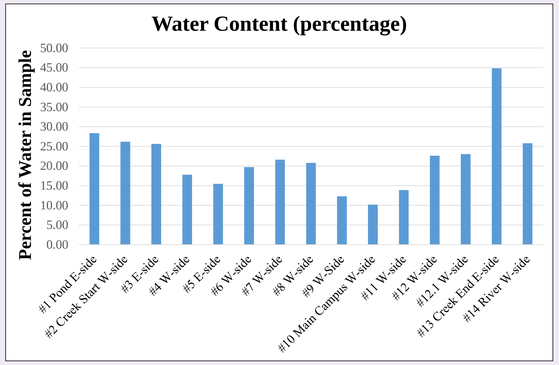
- Collected 14 samples along creek banks between East & West side.
- Dried, crushed, weighed, and sieved samples individually.
  - Weights taken of wet and dry samples
  - 2000, 500, 250, 63, & 45 micron sieves, plus catch pan.
  - Calculated percent of sample lost from dry weight and overall weight from sieves.



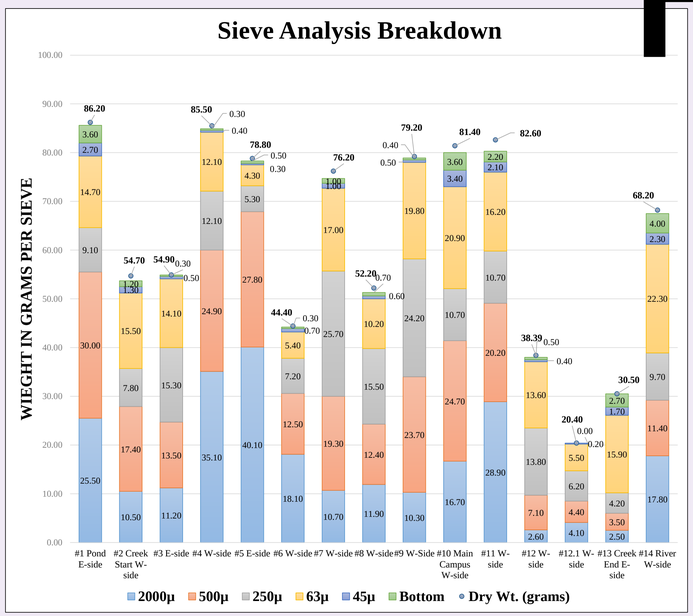
III. Results/Discussion

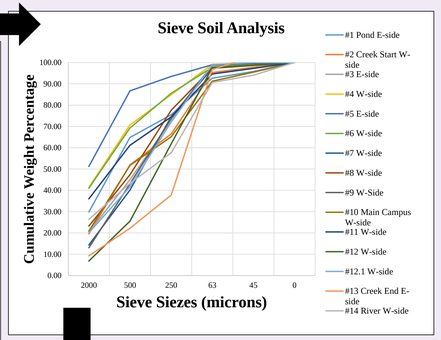
The soil sample data graph shows the variations in wet weights, dry weights, change in sample weights, and the amount of sample lost. Lost sample can be attributed to dust, traces left on equipment, and human error.

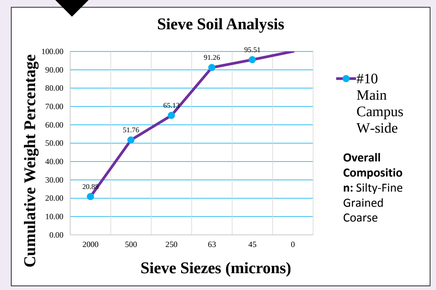




The sieve analysis graph visually shows the makeup of each sample including the weights of each sieve set and compares it to the overall sample weight. Here it is easy to see the changes in composition per sample and across the board and how each sample has a higher amount of fine-grained sand than coarse-grained. In the sieve soil analysis graph, one can see the cumulative weight percent by the sieve size (grain size) in microns to better understand the composition of each sample.







III. Results/Discussion Cont.

Water content starts just shy of 30% and begins decreasing whereupon it begins increasing by Sample 6, and back down by Sample 11. This gentle sloping springs from drains that lead into the creek. Where there is a higher amount of water flowing into the creek, the overall water content for those samples increases. Sample 13 isn't located in a drainage zone, but is heavily covered in organic materials. Complex root systems in the soil contribute to higher water content. Sample 13 underwent an ashing process to remove organic materials before being processed. Due to furnace malfunctions and human errors, parts of this sample were lost to melting and fusing to the crucible, however, viable data was still recovered.

IV. Conclusions

Given the data collected and results found, it is obvious that the soil composition changes as you go downstream from a primarily fine and coarse grained sand to a fine and very fine grained sand with a higher concentration of clay and silt. From these results, it's reasonable to predict other streams in the NE Indiana area might follow the same trend. This is part of an ongoing project.

V. References

- USGS OFR 2005-1048: Figure 9. (2005, January 1). Retrieved November 1, 2014, from http://woodshole.er.usgs.gov/pubs/of2005-1048/htmldocs/figures/f9_chart.htm
- Particle Size Distribution Analyses. (n.d.). Retrieved November 1, 2014, from http://www.particletechlabs.com/sieve-analyses
- Reddy, K. (2002, January 1). Experiment 2: Organic Matter Determination. Retrieved November 1, 2014, from http://www.uic.edu/classes/cemm/cemmlab/Experiment 2-Organic Content.pdf

VI. Acknowledgements

- IPFW Geosciences Department for use of lab equipment
- Dr. Solomon Isiorho